LASPEH “Low Adriatic SPEcies and Habitat”

D.T1.3.1 Concrete actions for habitat

PP “Natural Regional Park Litorale di Ugento” – Report ver. 1

Sommario

1 Introduction

Each monitoring is linked to the needs of the project, to the area of study and to be planned and structured according to the species to be investigated and the information to be obtained from the collected data. The quantitative and qualitative analysis of the richness and biodiversity of wetlands is an important tool in order to estimate the environmental suitability of the various sites and evaluate the effectiveness of the conservation measures implemented, such as environmental restoration and improvements, wildlife-hunting management, the regulation of impacting anthropogenic activities, the management of water levels, etc. (Baccetti et. al.2011). This tool is useful both in the phase in which it is necessary to decide on the allocation of funding for conservation by the bodies in charge (Ministries, Regions, Provinces), and for a subsequent evaluation of the effectiveness of the interventions by the management bodies of the areas. protected areas and wetlands in general. Waterfowl are a key element in designating and justifying the protection of the most important wetlands: their sensitivity to environmental changes, their relative ease of observation and their tendency to congregate in key sites make them effective tools for the protection of wider than biodiversity (Stroud et. al. 2001). The Litorale di Ugento natural park protects this type of habitat in which the species of Ferruginous Duck is present, one of the most common Anatidae up to the 1950s in much of its range (Robinson and Hughes, 2006) and subsequently characterized by a sudden decrease of population sometimes followed by areal contraction. For this reason, the first European Action Plan was drawn up in 1997 aimed at identifying the causes of the population decline and actions aimed at stemming it (Callaghan, 1997). In 2007 in Italy the National Action Plan was drawn up by the Ministry of the Environment and edited by the National Institute for Wild Fauna, which took up the challenge of conservation of this species, focusing for the Italian context on the conveyance of human and technical resources. and financial to achieve the objectives of the European plan (Melega, 2007).

2 Ferruginous Duck

The conservation status of the Ferruginous duck, especially with some demographic parameters close to the critical ranges indicated by the IUCN Red List of Threatened Animals, is, on a global level, that of "Near Threatened" (BirdLife International, 2000), while at a European level it is defined as vulnerable and of European conservation interest as a globally threatened species (SPEC 1, BirdLife International, 1994). In Italy it was included in the first Red List of Italian birds (Frugis and Schenk, 1981) as vulnerable and in the update it was considered "critically endangered" (Calvario et al., 1999). To date, with the release of the new Red List of nesting birds in Italy (2019), the assessment of its population is still "in critical danger". In the last 5-10 years, however, there has been a reversal of the trend: wintering contingents of a few tens of thousands of individuals have been registered in Central Asia (BirdLife International 2000, Robinson and Hughes, 2006) and also in Italy witnessed an increase in population that involved both wintering and breeding contingents (Baccetti et al, 2002; Melega, 2003a; 2003b; Tinarelli, 2001a; 2001b). Nevertheless, the main threats remain, such as habitat loss and degradation, accidental killing and poaching, making it necessary to identify the corresponding conservation objectives.

2.1 Notes on biology

The preferred reproductive habitat is represented by wetlands characterized by eutrophic, transparent waters, with depths between 30 and 100 centimeters and good coverage of floating and submerged hydrophytes. It nests on dense banks of floating vegetation or on the ground, more rarely in tree cavities, however always very close to the water.

The Ferruginous Duck has shown a good adaptability in the choice of reproductive sites, nesting in the reeds along the banks of the expansion basins, on the banks covered with reeds and willows of small quarries on sedge formations of flooded meadows and in small ponds within hygrophilous forests (Figure 1, Figure 2). This duck mainly feeds on seeds and green parts of aquatic plants, however there is an animal component, especially important in the reproductive period, which consists of small fish, amphibians and their eggs, as well as annelids, molluscs, crustaceans and insects. Foraging activities take place mainly in water mirrors rich in submerged and floating aquatic plants. However, the Ferruginous Duck is also able to exploit waters poor in macrophytes, feeding on benthic invertebrates.

Figure 1: Ferruginous Duck, Adult Male

Figure 2: Ferruginous duck, Female with offspring

The couple bond, monogamous and of seasonal duration, is formed starting from January. This species lays from 2 to 19 eggs (frequently 7-10); incubation, lasting several days, takes place from early May with delays until mid-June for late or replacement broods.

Young people fly off at the age of 55-60 days when they also reach independence.

2.2 Distribution and status in Italy

The distribution area of the wintering individuals is between Europe and western Africa to the west and south-eastern Asia to the east while the reproductive range is characterized by a fragmented distribution and extends from western Europe to China and western Mongolia.

In Italy the species is regularly present during the migratory period, in winter and during the reproductive season. In our country, based on the recent surveys carried out as part of the preparatory activities for the preparation and drafting of the action plan, a breeding population of 60-100 pairs is estimated, whose distribution is very fragmented. During the winter, the species is more widespread on the national territory although in recent years it has been very concentrated in Sicily where contingents exceeding 50% of the population have been recorded

2.3 Threats and limiting factors

The national action plan summarizes the threats and limiting factors:

- Habitat loss / degradation In a nutshell, a very limited availability of habitat makes populations concentrated and very vulnerable, as happened for example for the population.
- Remediation. The reclamation, which transformed the flat areas of the Italian territory between the second half of the 19th century and the early 1970s.
- Tourist and recreational activities. However, some activities can lead to significant habitat modifications.
- Construction and inappropriate management of dams. The dams, created mainly as water reserves for irrigation and / or for the production of electricity.
- Collisions with overhead cables. This factor causes regular and numerically significant mortality for anatidae, albeit locally.
- Invasive alien species. The invasion of alien animal or plant species currently represents one of the main threats to biodiversity, second only to the destruction of habitats.
- Unsuitable management of biotopes. Marsh ecosystems are, by their nature, transitional environments, whose vegetational associations in a short time naturally tend to evolve towards more and more terrestrial successions. This is due to the rapid growth of the vegetation that tends to invade the water mirrors, reducing their extension thanks to the large amount of organic substance produced which transforms into the soil, burying the flooded areas. Consequently, it is necessary to remove this biomass, in order to maintain the fundamental ecological characteristics of these ecosystems over time.
- Accidental Mortality, Fishing Nets, Accidental Killing, Pollution.
- Water pollution from agricultural activities. The quantity of chemicals detectable in the waters that pass through areas subject to intensive agriculture is considerable. The territories of the most important Italian nesting sites are often characterized by intensive agricultural activities, such as horticulture and greenhouse cultivation.

• Anthropogenic disturbance. Tourist and recreational activities. Within medium-small biotopes, some recreational activities are incompatible with the presence of nesting contingents, even modest, of Ferruginous Duck.

• Poaching. In light of some recent data, poaching appears to be one of the most important limiting factors.

• Lead poisoning. Lead poisoning is a major cause of death for aquatic birds (Sanderson and Bellrose, 1986). Birds ingest the pellets of hunting ammunition, dispersed during hunting, and the lead salts they release accumulate in various organs, damaging them

2.4 Legislation

At an international level, some Conventions signed by Italy and some Community Directives have considered this species and / or its habitat worthy of conservation interventions:

• The Ferruginous duck is listed in Annex I of the Bonn Convention to which threatened migratory species are ascribed;

• The Ferruginous duck is also included in Annex III (PROTECTED FAUNA SPECIES) of the Berne Convention;

• It is listed in Annex I of Directive 2009/147 / EC.

Finally, at the national level it is not in the list of huntable species pursuant to law no. 157/92, but does not appear among the particularly protected species referred to in art. 2.

3 STUDY AREA

The Litorale di Ugento regional natural park is a natural park in Puglia, established with Regional Law n. 13 of 28 May 2007 [1] [2]. The park is located along the Ionian coast, in the southernmost part of the Salento peninsula, and is bordered by the towns of Torre San Giovanni and Lido Marini. Protects, for a depth of about three kilometers from the coast and for a length of eight, a very valuable coastal sequence, consisting of a dune and back dune system, a series of tidal basins and connecting channels (Figure 3, Figure 4, Figure 5, Figure 6), from an imposing fossil cliff with ravines and from the largest Mediterranean scrub area of Salento.

The areas surrounding the basins, residues of the marshy environments of the past, are partly occupied by “hygrophilous” vegetation, in need of fresh water and a humid environment, which, by surface, constitutes one of the largest coastal lake environments in Salento. The basins, all connected to each other, have an outlet to the sea at the marinas of Torre San Giovanni, Torre Mozza and Punta Macolone, in Lido Marini.

The basins, the pine forest, the maquis and the coastal dune, with the temporary marshy inland areas (humid lowlands), of the Ugento coast, constitute an ecological complex of great wildlife interest, in particular as a transit point and stop on migratory routes, both as regards the wintering and the nesting of water birds (Figure 3, Figure 4, Figure 5, Figure 6, Figure 7, Figure 8). In fact, the wetlands protected by the PNR are included in the ISPRA wetlands cadastre and are monitored every year at the International Waterbird Census. This international project since 1991 has taken a census of the population of wintering waterfowl throughout Italy and Europe through data collection carried out only by technicians with proven experience in the ornithological field and who have passed the tests organized by ISPRA. This led to the creation of a database that provides

important and consistent historical series from which to extract useful information for the management and protection of Italian wetlands.

Figure 3: Basin Bianca

Figure 4: Basin Ulmo

Figure 5: Basin Rottacapozza Nord

Figure 6: Basin Rottacapozza Sud

Figure 7: The pine forest

Figure 8: One of the water channels

4 THE MONITORING PROTOCOL

Considering the importance of the wetlands that the NRP protects, it was decided to give greater importance to aquatic avifauna, concentrating most of the monitoring effort for these species and identifying the target species in the Ferruginous Duck Aythya nyroca. The methodology applied for data collection was that used during the IWC, using a detector recognized by ISPRA, who collected data through direct observation from fixed points with attention to the chorology and phenology of the species.

The technique used, specifically, was that of "Counting on sight on area" extended to all the birds present in the wetland and of the direct passive type (MDP) with absolute counting (CE). This means that all contacted individuals of all species have been counted. Furthermore, during the reproductive period, information on the probability of nesting coded according to the Atlas of nesting methods was recorded.

The surveys took place from the banks of the basins with a greater view and systematically covering some stretches of the highly natural channels. In some basins, where the vegetation does not offer a complete view, more observation points have been provided and a lot of attention has been paid to the recount error as from different locations one risks contacting the same individual several times. To contact the more elusive species, the listening technique was used, recording doubtful cases in the field. The goal of this method is to obtain results through standardized operating methods that report data on the qualitative and quantitative presences of the bird species under study, quantifying their presences in wetlands and defining their relative importance. Furthermore, this allows us to evaluate the populations over the year, phenology, chorology together with the recording of environmental variables, threats and anthropogenic disturbance. This protocol being designed on national and international standards and taking up the IWC methodologies and the Action Plan for the Ferruginous Duck, allows you to compare the data even with existing databases. In order to begin the historical series of the Park that will support the management body in deciding the interventions to be implemented and subsequently to test their effectiveness in relation to the protection of biodiversity in general and specific objectives. Furthermore, this procedure can be applied to all protected areas where there are wetlands.

In addition to the aquatic plants, the presences of all the other bird species were noted, counting all the individuals contacted through observation and listening. In addition, during the movements between one station and another, stops of 10 minutes were made for listening every 200 m.

As regards the Ferruginous Duck, in addition to the count of individuals, the presence of the species was initially recorded within the study area and then limited the frequentation areas based on the recorded data. On the basis of these, ad hoc observation sessions were carried out to study their ethology during the breeding period. Each observation point was geo-referenced via GPS and the data entered in specially created cards showing presence, abundance and, where possible, sex ratio and age range. In addition, in order to assess the consistency of reproductive activities, a part dedicated to ethology has been included in the field sheet in which the reproductive behaviors of the individuals detected have been noted: dances, parades, hatching etc. The data present in each sheet were entered in a digital database in the form of a matrix through which the processing was carried out. Furthermore, in order to validate them, the georeferenced data have been inserted into the Ornitho digital platform, a national reference for the entire ornithological world where all data are reviewed and validated by experts in the ornithological field of national and international caliber belonging to the Italian Ornithological Studies Center which to the National Ornithological Commission.

During the sessions professional optical instruments were used to observe and photograph the target species and the ornithic community in general and, at each exit, photographic evidence collected by date in a photo-video archive to support the monitoring, research and to carry out a correct communication of the project activities.

The following professional tools were used during all field trips:Cannocchiale Swarovski Optik ATS 65 HD 20-60x(Figure 9);

- Binoculars Kowa BD 8X42 PROMINAR XD (Figure 10);
- Tripod Manfrotto 128rc (Figure 11);
- Canon reflex with 300mm f4.0 lens (Figure 12);
- Canon Swarovski digi-scoping adapter (Figure 13);
- Digital sound recorder EVISTA L53(Figure 14).

Figure 9

Figure 10

Figure 11

Figure 12

Figure 13

Figure 14

5 THE MONITORING EFFORT

Field exits were carried out every 30 days during the period July 2019-March 2020, preferring the early hours of the morning to be more likely to contact the target species. In the following period up to the end of the project they were intensified by carrying out them first every 15 days and then every 7. In total there were 16 outings and each had an average duration of about 5 hours. At each

exit, the two selected routes were taken along the connecting channels between the basins, respectively 2.2km long and 1.1km long.

Furthermore, during the breeding season of the Ferruginous Duck in addition to the higher frequency of exits, further exits were carried out, even for 3 consecutive days, dedicated to the target species to study it carefully. There were 8 additional outputs with observations made at dawn for 3 hours from 6.00 to 9.00, from 12.00 to 14.00 and at dusk from 17 to 20.00. For 8 hours of observation per day.

Below is the summary table of the monitoring effort carried out and the tables (Table 1) showing the observation points and the routes (Figure 15, Figure 16).

Table 1

	Number of exits	Observation / exit hours	Total hours by type of activity
Monitoring exits	16	5	80
Additional days for the Ferruginous Duck	8	8	64
		Total hours of observation	144

	Km traveled / exit	Number of exits	Total km traveled
Km of routes	3,3	16	52,8

Figure 15

Figure 16

6 RISULTS

6.1 The checklist e focal species

The checklist containing the 102 contacted species belonging to 35 families was extracted from the matrix created. The species found were compared with those listed in the annexes of the main directives for the protection of biodiversity, inserting this information next to each one. Below are the indications of the comparison documents:

- Bird Directive 2009/147 / EC Annex I;
- Red list of Italian vertebrates 2012;
- Red list of Italian nesting birds 2019;
- IUCN global assessment 2019;
- Berne Convention App. II / III (1979);
- Bonn Convention Annexes 1 and 2 (1979).

With this information, the check list of the species contacted was created in which, for each, there is a summary of protection. This tool, easy to read and shown below, provides an image of the importance that the Litorale d'Ugento Park plays in the conservation of wildlife, focal species and nature.

FAMILY	SCIENTIFIC NAME	COMMON NAME	All. I Dir. Birds 2009/147/CE	Italian category IUCN pop. 2012	Italian category IUCN pop. 2019	Global category IUCN 2019	Bern Convention App. II/III(1979)	Bonn Convention Allegati 1 e 2
Accipitridae	*Aquila pennata [Hieraaetus pennatus]*	Aquila minore	x	NA	NA	LC		2
Accipitridae	*Circus aeruginosus*	Falco di palude	x	VU	VU	LC		2
Accipitridae	*Pernis apivorus*	Falco pecchiaiolo	x	LC	LC	LC		2
Accipitridae	*Accipiter nisus*	Sparviere		LC	LC	LC		2
Alaudidae	*Galerida cristata*	Cappellaccia		LC	LC	LC		
Alcedinidae	*Alcedo atthis*	Martin pescatore	x	LC	LC	VU	II	
Anatidae	*Anas crecca*	Alzavola		EN	EN	LC		2
Anatidae	*Anas strepera*	Canapiglia		VU	NT	LC		2
Anatidae	*Anas penelope*	Fischione		NA	NA	LC		2
Anatidae	*Anas sibilatrix*	Fischione del Cile		NA	NA	LC		2
Anatidae	*Anas platyrhynchos*	Germano reale		LC	LC	LC		2
Anatidae	*Anas querquedula*	Marzaiola		VU	VU	LC		2
Anatidae	*Anas clypeata*	Mestolone		VU	VU	LC		2
Anatidae	*Aythya fuligula*	Moretta		VU	VU	LC		2
Anatidae	*Aythya nyroca*	Moretta tabaccata	x	EN	EN	NT		2
Anatidae	*Aythya ferina*	Moriglione		EN	VU	VU		2
Anatidae	*Tadorna tadorna*	Volpoca		VU	VU	LC	II	2
Apodidae	*Apus apus*	Rondone comune		LC	LC	LC		
Ardeidae	*Casmerodius albus [Egretta alba]*	Airone bianco maggiore	x	NT	NT	LC	II	
Ardeidae	*Ardea cinerea*	Airone cenerino		LC	LC	LC		
Ardeidae	*Bubulcus ibis*	Airone guardabuoi		LC	LC	LC	II	
Ardeidae	*Ardea purpurea*	Airone rosso	x	LC	LC	LC	II	
Ardeidae	*Egretta garzetta*	Garzetta	x	LC	LC	LC	II	
Ardeidae	*Nycticorax nycticorax*	Nitticora	x	VU	LC	LC	II	
Ardeidae	*Ardeola ralloides*	Sgarza ciuffetto	x	LC	NT	LC	II	
Ardeidae	*Ixobrychus minutus*	Tarabusino	x	VU	VU	LC	II	
Ardeidae	*Botaurus stellaris*	Tarabuso	x	EN	EN	LC	II	

Charadriidae	*Charadrius hiaticula*	Corriere grosso		NA	NA	LC	II	2
Charadriidae	*Charadrius dubius*	Corriere piccolo		NT	LC	LC	II	2
Charadriidae	*Charadrius alexandrinus*	Fratino	x	EN	EN	LC	II	2
Columbidae	*Columba palumbus*	Colombaccio	x	LC	LC	LC	III	
Columbidae	*Streptopelia decaocto*	Tortora dal collare		LC	LC	LC		
Corvidae	*Corvus cornix*	Cornacchia grigia		LC	LC	LC		
Corvidae	*Pica pica*	Gazza		LC	LC	LC	III	
Corvidae	*Corvus monedula*	Taccola		LC	LC	LC	III	
Emberizidae	*Emberiza calandra*	Strillozzo		LC	LC	LC		
Falconidae	*Falco vespertinus*	Falco cuculo	x	VU	VU	NT	II	
Falconidae	*Falco peregrinus*	Falco pellegrino	x	LC	LC	LC	II	2
Falconidae	*Falco tinnunculus*	Gheppio		LC	LC	LC	II	2
Fringillidae	*Carduelis carduelis*	Cardellino		NT	LC	LC	II	
Fringillidae	*Carduelis cannabina*	Fanello		NT	LC	LC	II	
Fringillidae	*Fringilla coelebs*	Fringuello		LC	LC	LC		
Fringillidae	*Carduelis chloris*	Verdone		NT	NT	LC	II	
Fringillidae	*Serinus serinus*	Verzellino		LC	LC	LC	II	
Hirundinidae	*Hirundo rustica*	Rondine		NT	NT	LC	II	
Hirundinidae	*Riparia riparia*	Topino		VU	VU	LC	II	
Laniidae	*Lanius senator*	Averla capirossa		EN	EN	LC	II	
Laridae	*Hydrocoloeus minutus*	Gabbianello	x	NA	NA	LC	II	
Laridae	*Chroicocephalus ridibundus [Larus ridibundus]*	Gabbiano comune		LC	LC	LC		
Laridae	*Larus melanocephalus*	Gabbiano corallino	x	LC	NT	LC	II	
Laridae	*Larus audouinii*	Gabbiano corso	x	NT	LC	LC	II	1
Laridae	*Larus michahellis*	Gabbiano reale		LC	LC	LC		
Laridae	*Chroicocephalus genei [Larus genei]*	Gabbiano roseo	x	LC	NT	LC	II	
Meropidae	*Merops apiaster*	Gruccione		LC	LC	LC	II	2
Motacillidae	*Motacilla alba*	Ballerina bianca		LC	LC	LC	II	
Motacillidae	*Motacilla flava*	Cutrettola		VU	LC	LC	II	
Motacillidae	*Anthus pratensis*	Pispola		NA	NA	LC	II	

Muscicapidae	*Ficedula hypoleuca*	Balia nera		NA	NA	LC	II	2
Muscicapidae	*Muscicapa striata*	Pigliamosche		LC	LC	LC	II	2
Pandionidae	*Pandion haliaetus*	Falco pescatore	x	EN	CR	LC	II	2
Paridae	*Parus major*	Cinciallegra		LC	LC	LC	II	
Paridae	*Cyanistes caeruleus [Parus caeruleus]*	Cinciarella		LC	LC	LC	II	
Passeridae	*Passer italiae [Passer d. italiae]*	Passera d'Italia		VU	NT	VU		
Phalacrocoracidae	*Phalacrocorax carbo*	Cormorano		LC	LC	LC		
Podicipedidae	*Podiceps cristatus*	Svasso maggiore		LC	LC	LC		
Podicipedidae	*Podiceps nigricollis*	Svasso piccolo		NA	NA	LC		
Podicipedidae	*Tachybaptus ruficollis*	Tuffetto		LC	LC	LC	II	
Rallidae	*Fulica atra*	Folaga		LC	LC	LC		
Rallidae	*Gallinula chloropus*	Gallinella d'acqua		LC	LC	LC		
Rallidae	*Rallus aquaticus*	Porciglione		LC	LC	LC		
Rallidae	*Porzana parva*	Schiribilla	x	DD	CR	LC	II	
Recurvirostridae	*Himantopus himantopus*	Cavaliere d'Italia	x	LC	LC	LC	II	2
Remizidae	*Remiz pendulinus*	Pendolino		VU	VU	LC		
Scolopacidae	*Calidris minuta*	Gambecchio comune		NA	NA	LC	II	2
Scolopacidae	*Tringa nebularia*	Pantana		NA	NA	LC		2
Scolopacidae	*Tringa glareola*	Piro piro boschereccio	x	NA	NA	LC	II	2
Scolopacidae	*Actitis hypoleucos*	Piro piro piccolo		NT	NT	LC		2
Sternidae	*Sternula albifrons*	Fraticello	x	EN	NT	LC	II	
Strigidae	*Otus scops*	Assiolo	x	LC	LC	LC	II	
Strigidae	*Athene noctua*	Civetta	x	LC	LC	LC	II	
Sturnidae	*Sturnus vulgaris*	Storno		LC	LC	LC	III	
Sulidae	*Morus bassanus*	Sula		EN	NA	LC		
Sylviidae	*Cisticola juncidis*	Beccamoschino		LC	LC	LC	II	
Sylviidae	*Hippolais polyglotta*	Canapino comune		LC	LC	LC	II	
Sylviidae	*Acrocephalus scirpaceus*	Cannaiola comune		LC	LC	LC	II	
Sylviidae	*Acrocephalus arundinaceus*	Cannareccione		NT	NT	LC	II	
Sylviidae	*Sylvia atricapilla*	Capinera		LC	LC	LC	II	

Sylviidae	*Acrocephalus melanopogon*	Forapaglie castagnolo	x	VU	EN	LC	II	
Sylviidae	*Acrocephalus schoenobaenus*	Forapaglie comune		CR	CR	LC	II	
Sylviidae	*Phylloscopus collybita*	Luì piccolo		LC	LC	LC	II	
Sylviidae	*Phylloscopus sibilatrix*	Luì verde		LC	LC	LC	II	
Sylviidae	*Sylvia melanocephala*	Occhiocotto		LC	LC	LC	II	
Sylviidae	*Cettia cetti*	Usignolo di fiume		LC	LC	LC	II	
Turdidae	*Phoenicurus phoenicurus*	Codirosso comune		LC	LC	LC	II	
Turdidae	*Oenanthe oenanthe*	Culbianco		NT	LC	LC	II	
Turdidae	*Turdus merula*	Merlo		LC	LC	LC		
Turdidae	*Erithacus rubecula*	Pettirosso		LC	LC	LC	II	
Turdidae	*Saxicola rubicola*	Saltimpalo		VU	EN	LC		
Turdidae	*Saxicola rubetra*	Stiaccino		LC	VU	LC	II	
Turdidae	*Luscinia megarhynchos*	Usignolo		LC	LC	LC	II	
Tytonidae	*Tyto alba*	Barbagianni	x	LC	LC	LC	II	
Upupidae	*Upupa epops*	Upupa		LC	LC	LC	II	

Legenda dei criteri di valutazione IUCN	
LC	Nessuna preoccupazione
NT	Prossima alla minaccia
VU	Vulnerabile
EN	In pericolo
CR	In pericolo critico
DD	Mancanza di dati
NA	Irregolare\Occasionale\Introdotto

The checklist made it possible to identify the species of conservation interest present in the study area summarized in Chart 1. It should be borne in mind that some focal species are present in multiple lists of the various protection regulations.

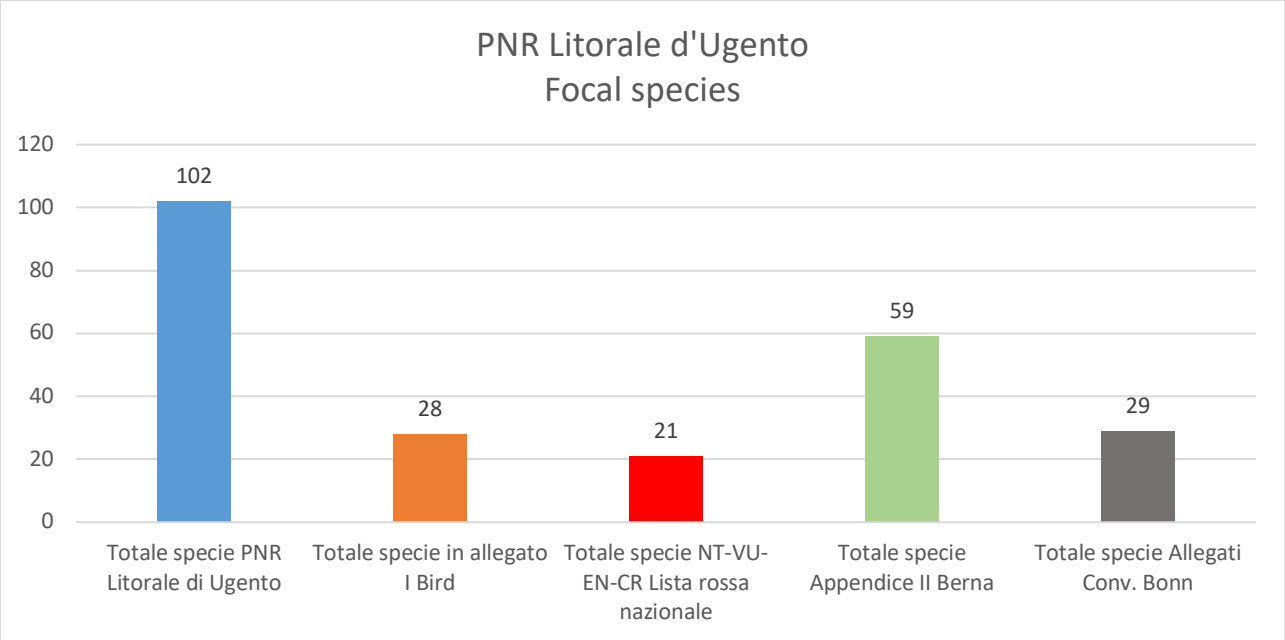

Chart 1

The first Community directive on nature conservation was **Directive 79/409 / EEC "Birds"** concerning the protection of wild birds. This Directive remains in force and integrates within the provisions of the Habitats Directive and has undergone various changes over the years, the last in 2009 which integrates and recodes all of them.

The Birds Directive recognizes habitat loss and degradation as the most serious risk factors for the conservation of wild birds; therefore, the objective is to protect the habitats of the species listed in Annex I and of the migratory species not listed that return regularly, through a coherent network of Special Protection Areas (SPAs) that include the territories most suitable for the survival of these species. The species found in the study area and listed in Annex I are 25% of the total as reported in Chart 2.

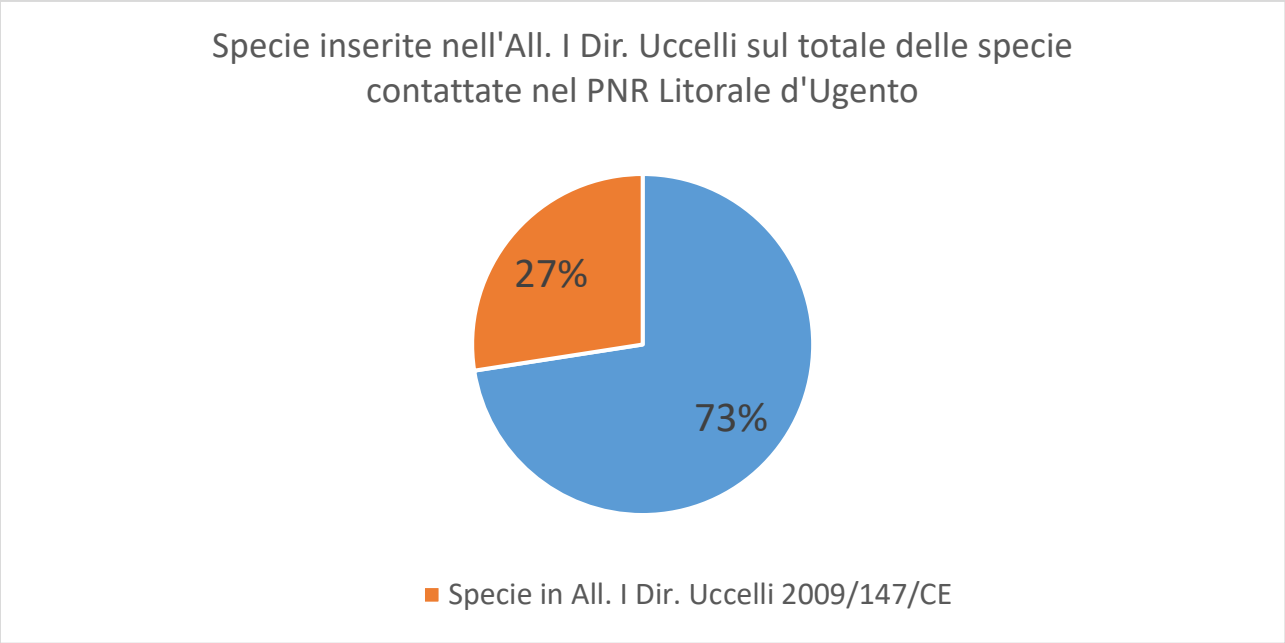

Chart 2

Active for 50 years, the **IUCN Red List** is the most comprehensive inventory of the risk of extinction of species globally. It initially collected the subjective assessments of the level of extinction risk according to the main experts of the different species. To date, however, regional red lists are drawn up annually for state organizations and bodies, which are responsible for managing the information received at a political and strategic level. For nesting birds in Italy, the most recent is dated 2019. Chart 3 and Chart 4 summarize the status of the species within the PNR.

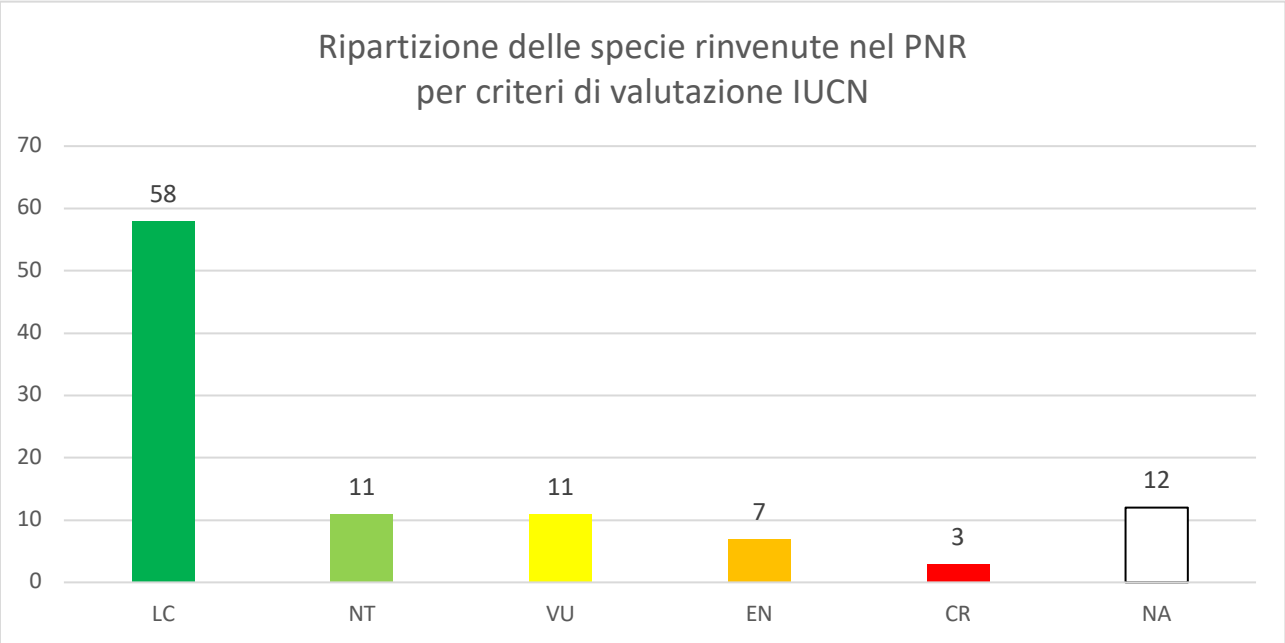

Chart 3

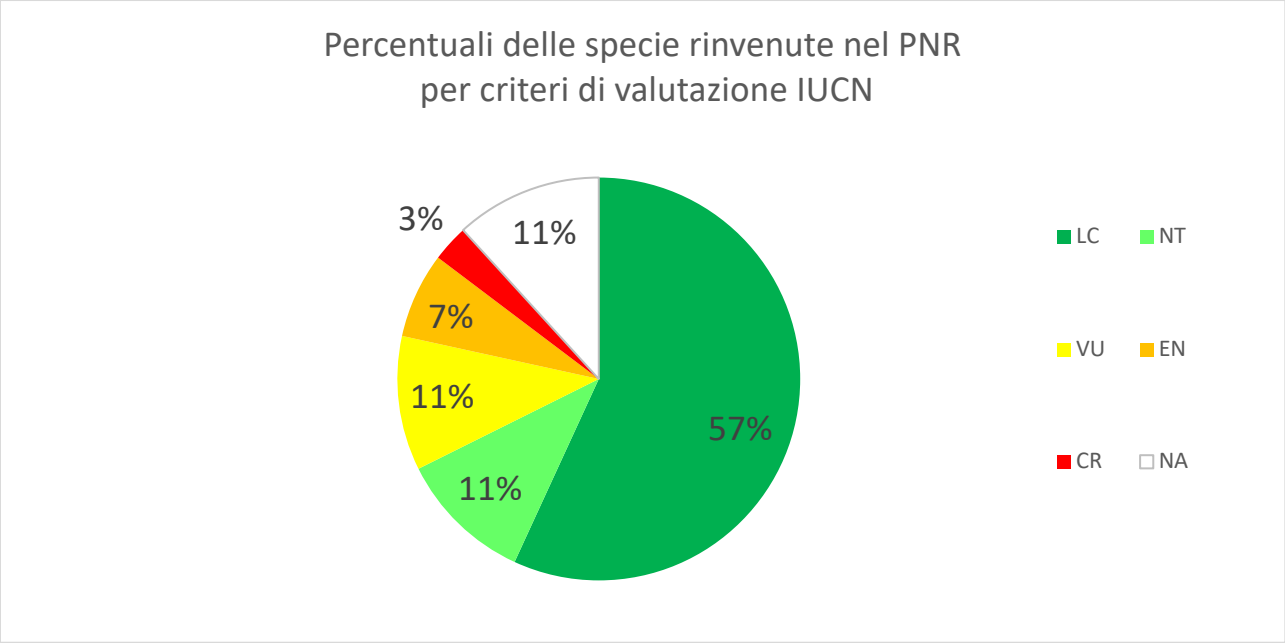

Chart 4

Opened for signature on 19 September 1979 and known as the **Berne Convention**, the Convention on the Conservation of Wildlife and Natural Habitats has as its objectives the conservation of wild flora and fauna, natural habitats and the promotion of cooperation between states. Furthermore, it pays particular attention to threatened and vulnerable species, including migratory ones. The Convention includes 4 annexes: strictly protected plant species (I), strictly protected animal species

(II), protected animal species (III), prohibited tools and methods of killing, capturing or other types of exploitation (IV).

49 countries plus the European Union adhere to this convention (March 15, 2011). The comparison with the annexes of the Bern Convention showed that 66 species equal to 59% of the total species contacted are included in Annexes II and III (Chart 5).

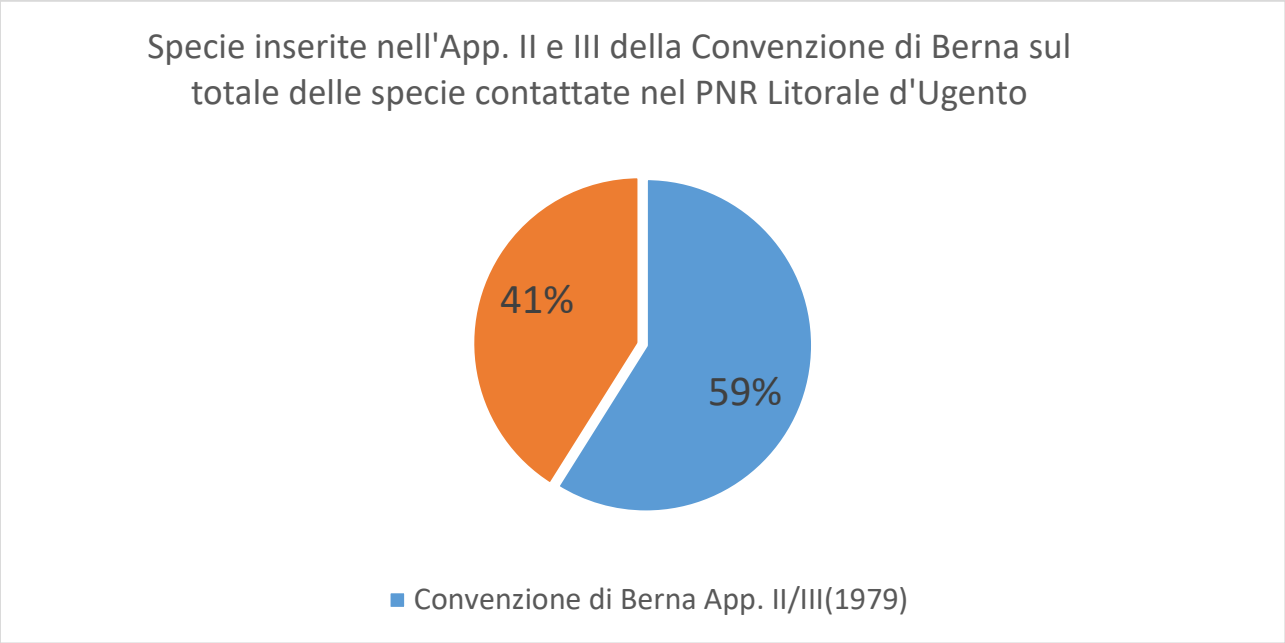

Chart 5

The Bonn Convention is an intergovernmental treaty concluded under the aegis of the UN which aims to guarantee the conservation of terrestrial, aquatic and aerial migratory species throughout the range, with particular regard to those threatened with extinction (Annex 1) and those in a bad state of conservation (Annex 2), 115 countries plus the European Union adhere to the Convention (July 2011). From the data analysis it emerged that 29% of the total species found by this study are listed in Annexes I and II of the Convention (Chart 6).

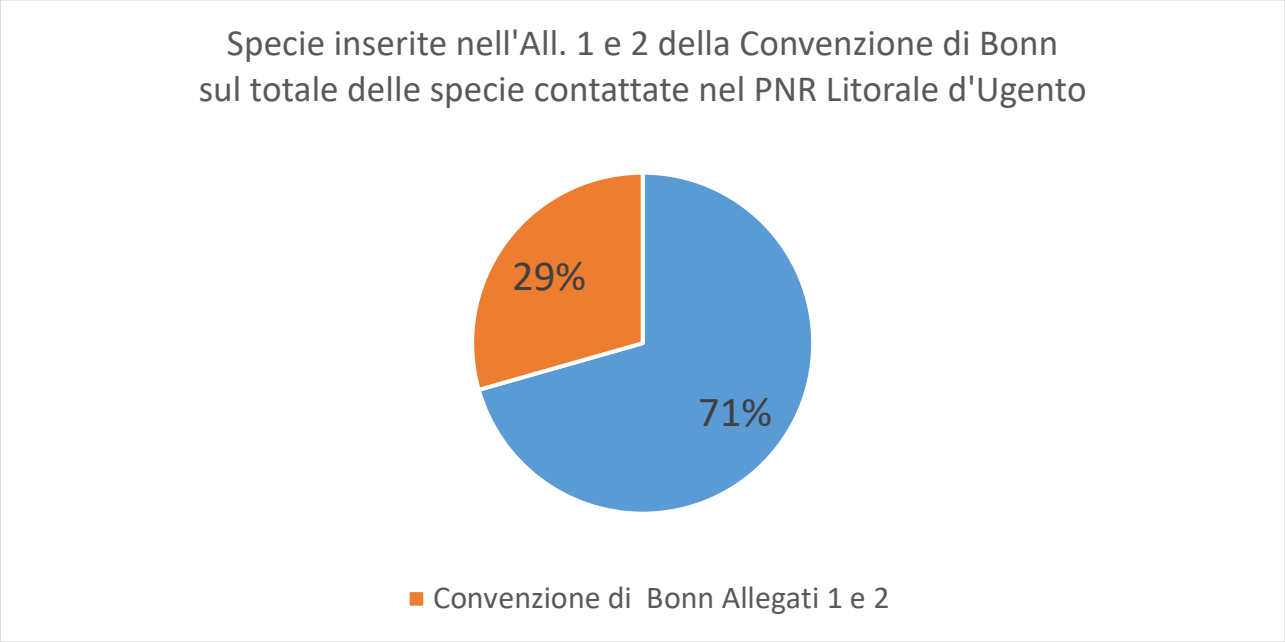

Chart 6

6.2 Families and species

All the species found during the monitoring period belong to a total of 33 families (Chart 7).

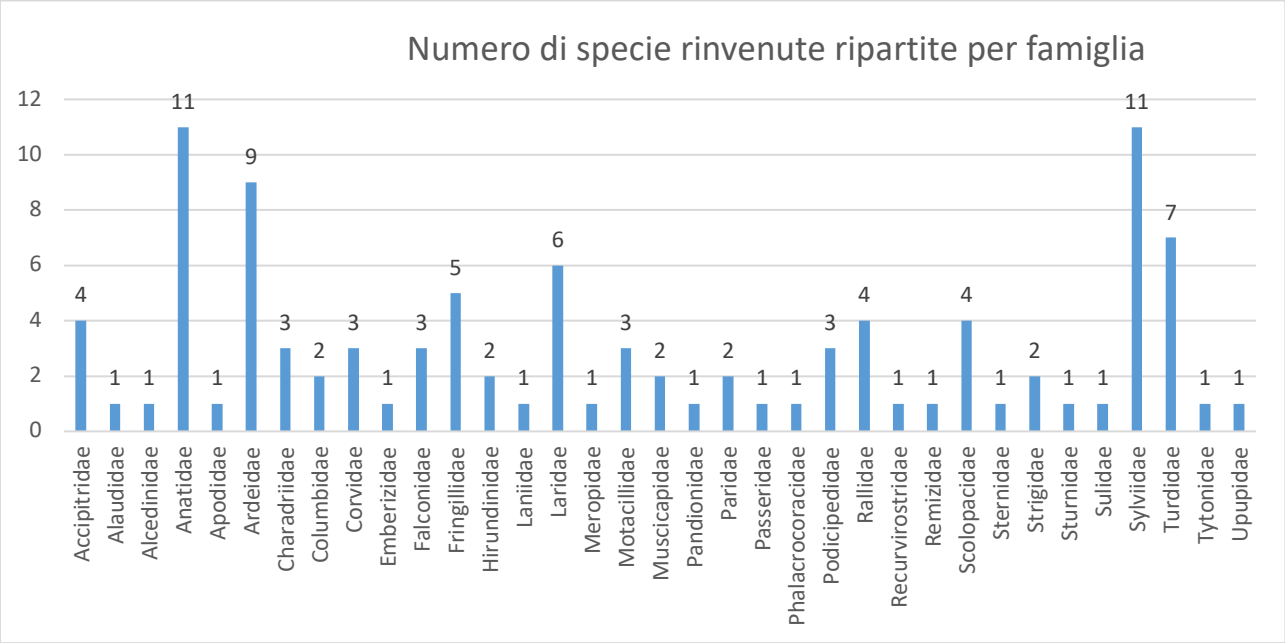

Chart 7

The families most present in the PNR are the Anatidae and the Sylvidae with 11 species and the Ardaeidae with 9. Followed by Turdidae with 7 species and Laridae with 6. Then we find the Fringillidi with 5 and 4 for Accipitrids, Rallids and Scolopacids, while the There are 3 Charadrids as well as Podicepods.

6.3 Anatids

The species of this family are the most present within the selected study area. They are present throughout the year with the maximum peak during the wintering period (Chart 8).

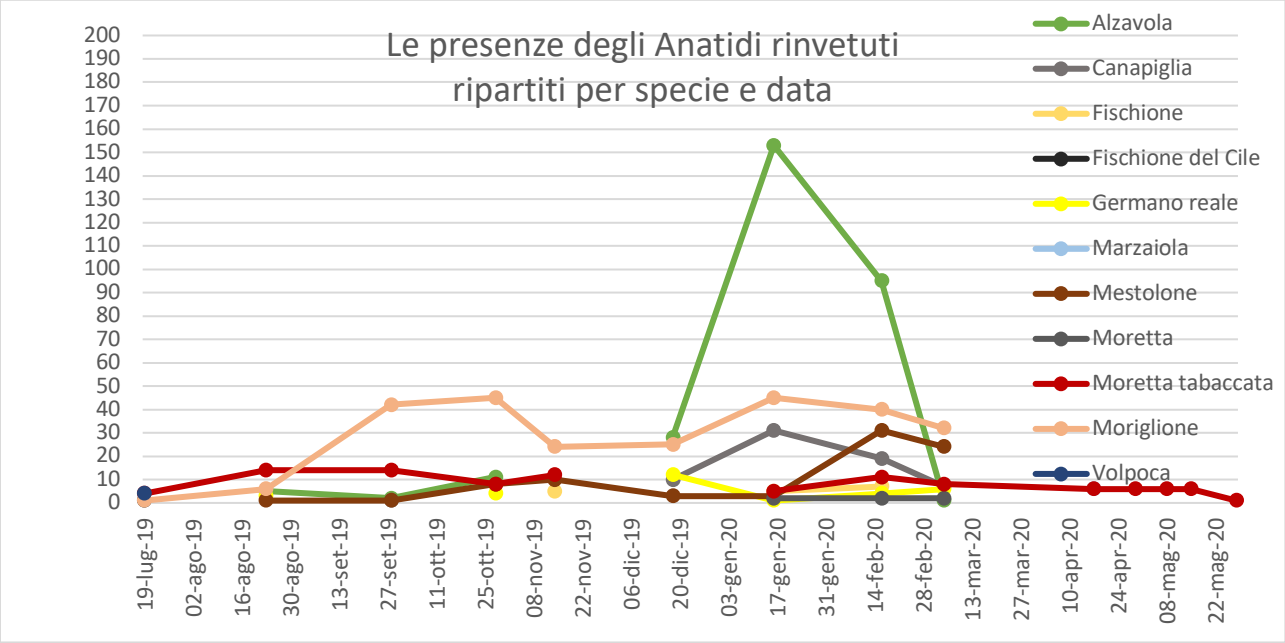

Chart 8

In addition to the Ferruginous duck (Figure 17), whose presence has been ascertained throughout the year and which will be further explored later, the common Moretta, Canapiglia, Mestolone,

Moriglione (Figure 18), Marzaiola, must also be mentioned. Germano reale (Figure 19: Germano reale, male and female, Volpoca and Alzavola. The latter is the species for which the highest number of individuals has been recorded. There is also an individual of Fischione of Chile (Figure 20), a species used for ornamental purposes, probably escaped from a farm.

Figure 17: Ferruginous Duck with other anatids

Figure 18: Moriglione adult male

Figure 19: Germano reale, male and female

Figure 20: Fischione del Cile and Folaga

6.4 Ardeids

Further information was to confirm the importance of the protected area for Ardeidae. During the migrations, the presence of numerous species belonging to this family was recorded (Figure 21, Figure 22, Figure 23, Figure 24), with the spring one showing the simultaneous presence of all the species in the checklist (Chart 9).

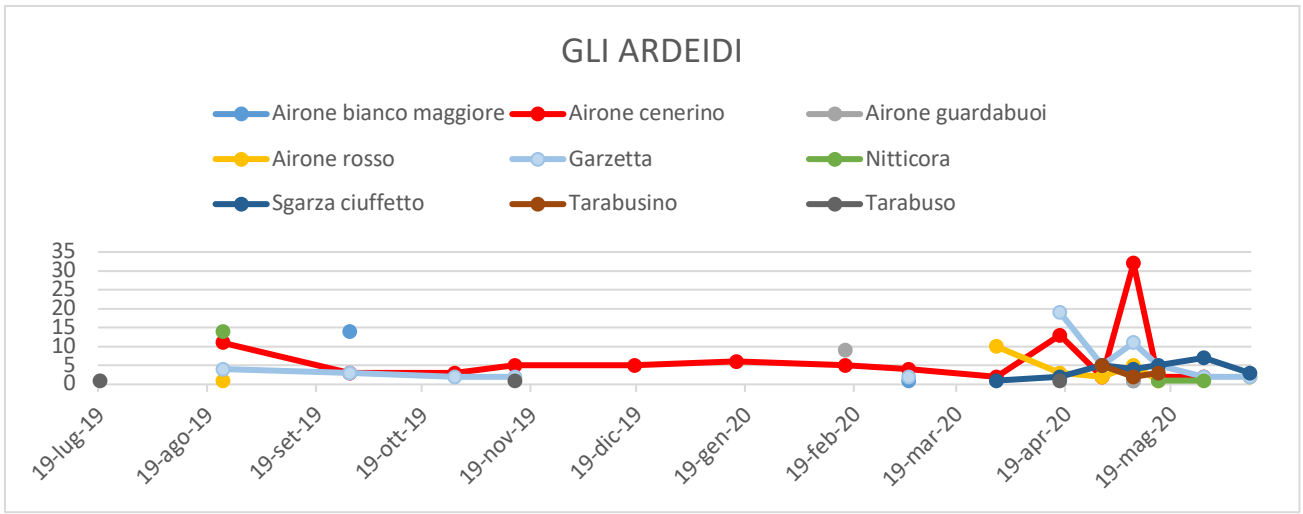

Chart 9

Figure 21: Purple and gray herons migrating in the PNR

Figure 22: Great white heron

Figure 23: Nitticora

Figure 24: Garzetta

6.5 Sylvids

This family groups numerous sub-families for which the high number of species is a direct consequence of the current taxonomy. Among these we should mention the Acrocephalidae linked to the reeds habitat present in the PNR, here they find ideal conditions both for stopping during migration and for nesting. For these species it is worth mentioning the nesting of the Cannaiola (Figure 25: Cannaiola) and the presence of the Cannareccione, common Forapaglie (Figure 26) and Forapaglie Castagnolo during the spring migration.

Figure 25: Cannaiola

Figure 26: Common Forapaglie

6.6 Laridae

This family is well represented in the Ugento Natural Park, a direct consequence of the proximity to the sea of the protected area. In addition to the presence of the Common Gabbiano linked to the

wintering period and those of the Mediterranean Gabbiano reale present throughout the year, the Gabbiano corso (Figure 27) also present in the summer period, the Gabbiano roseo, the Corallino and the Gabbianello (Figure 28) contacted during migrations.

Figure 27: Gabbiano corso

Figure 28: Gabbiano, gabbianello e moretta tabaccata

6.7 Rapacious

Given the types of habitats that the PNR protects one would not expect a notable diversity for these species but, considering the Accipitridae, Falconidae and Pandionidae families together, the presence of 8 species has been recorded. From the data it emerges that the most important information is linked to the wintering of the Aquila minore (clear morphism, Figure 29), of an adult female Falco di Palude (Figure 30) and the passage during the migrations of the Falco pescatore (Figure 31) , Falco pecchiaiolo (Figure 32) and Falco cuculo.

Figure 29: Aquila minore

Figure 30: Falco di palude

Figure 31: Falco pescatore

Figure 32: Falco pecchiaiolo

6.8 Podicepods

For the species belonging to this family, the nesting of the Great Grebe (Figure 33, Figure 34) and of the Svasso maggiore (Figure 35) has been verified and documented. For the Svasso maggiore it was also possible to witness the suggestive mating dance often reported in numerous documentaries. Furthermore, during the wintering, the presence of the Svasso piccolo was recorded (Figure 36), also detected during the late spring migration, allowing to admire its intermediate plumage.

Figure 33: Couple of svassi maggiori

Figure 34: Tuffetto

Figure 35: Svasso maggiore

Figure 36: small svasso with intermediate plumage

6.9 The waders and the fraticello

An important criticality emerged from the study: the low presence both in terms of number of species and of individuals for waders throughout the year. The long cemented banks makes this wetland unusual, especially due to its proximity to the sea. In fact, for these species the measurements are almost all subsequent to the exceptional meteoric event that occurred in November 2019, where a strong sirocco storm led to the accumulation of a lot of sandy sediment along the southern shore of the Rottacapozza Sud basin. This event of considerable magnitude. has substantially covered a portion of the bank in concrete (Figure 37), re-naturalizing it and making it suitable for frequenting waders (Figure 38) with species of the families: Recurvirostridae (Figure 39), Scolopacidae (Figure 40) and Charadridae (Figure 41). This has also favored the presence of individuals of Fraticello, Sternidae that could potentially nest in the PNR. Some individuals of this species have shown nesting behaviors such as nest building and food exchange (Figure 42) unfortunately not successful due to the return of anthropogenic pressure, strongly mitigated in that period by the restrictions due to the spread of the Covid 19 pandemic.

Figure 37: Concrete bank

Figure 38: Renaturalized bank

Figure 39: Cavalieri d'Italia

Figure 40: Piro piro boschereccio

Figure 41: Fratino

Figure 42: Fraticelli, food exchange

The information collected for these species, as well as for the cognitive scientific value, were important because they contributed to the conception and planning of environmental improvement interventions such as the increase in the surface of the reeds, the elimination of artificial banks in basins with greater naturalness and the reduction of anthropic disturbance.

6.9 The Ferruginous duck

For this species, the presence was ascertained since the first field trips occurred in the summer of 2019 where the first individuals were contacted (Figure 43). From subsequent surveys it was then

possible to ascertain that this species is present throughout the months of the year with the peak in autumn migration with 14 individuals (Chart 10).

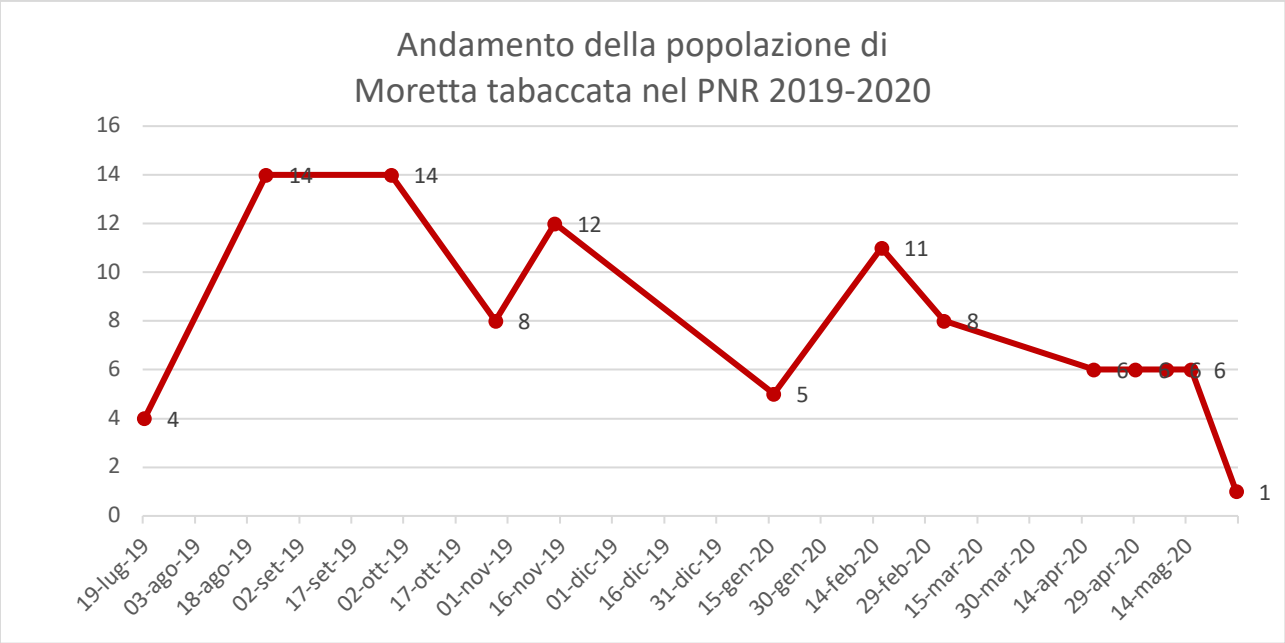

Chart 10

The surveys made in the Ulmo Basin were very unique, an area characterized by low naturalness but which saw the presence of various individuals during all the cold months, January-March 2020 (Figure 44).

Figure 43: First ferruginous duck found

Figure 44: Group of First ferruginous ducks

From the wintering to the reproductive period, March-May 2020, the number of individuals has been reduced to reach 6 adult individuals of which 3 males and 3 females who were permanently found in the Rottacapozza Nord basin, where the reeds are very dense but superficial rather poor. Precisely in this stretch of water it was decided to intensify the monitoring effort by increasing the observation sessions from mid-April to the end of May and carrying them out, in line with what is indicated in the action plan, at various times: dawn, late morning and sunset. During these observations, the behavior that individuals exhibited was also noted:

April 17, 2020: in the Rottacapozza North Basin, 6 individuals detected both male and female, who after trophic activity always returned to the same spot in the reeds.

Figure 45: Male in trophic activity

Figure 46: he reeds where all the individuals fall

April 28-30, 2020: almost exclusively males were contacted, 3 in reproductive livery, who spent the whole day frantically feeding for about 2 hours, always returning to the same point of the fragmiteto and then coming out after 4-6 minutes and resuming to eat (Figure 47: Male returning after feeding Figure 48). This behavior has led us to suppose that it could be the supply of food to the females during the hatching, assuming the area of potential nesting.

Figure 47: Male returning after feeding

Figure 48: Males fit in the usual spot

7-9 May 2020: Upon arrival in the evening on the water mirror, the presence of a fixed gillnet and the presence of two fishermen on a rowboat are detected (Figure 49, Figure 50). Thanks to the arrival of the Municipal Police, the net was quickly removed despite the reluctance of the two fishermen who left, abandoning the boat.

Figure 49: The net positioned along the reeds

Figure 50: The boat used by fishermen

This was located along the entire reed bed, therefore it is believed that it disturbed the species present, including the Ferruginous Duck, which however reappeared at sunset (Figure 51). From the following morning, the 6 individuals, both males and females, are seen again, feeding and resting on the water, without showing any behaviors that suggest potential reproduction (Figure 52). From this one begins to think that the probabilities of nesting have decreased considerably.

Figure 51: Male reappeared at sunset

Figure 52: Couple found the following morning

15-17 May 2020: The 6 Ferruginous Duck (Figure 53) are always present in the Rottacapozza Nord basin during all time slots, showing only trophic activity and rest on the body of water. In this session we find the traces of a recent fire that involved the reeds frequented by the animals, albeit externally (Figure 54). This factor is also believed to have negatively affected breeding success for the species.

Figure 53: Male and female in feeding

Figure 54: Fire along the reeds

May 28, 2020: Individuals are also detected in the other basins as if they had changed their frequentation areas and are no longer found in the Rottacapozza North Basin (Figure 55, Figure 56).

Figure 55: Couple flying on Ulmo basin

Figure 56: Female flying

June 5, 2020: After a long time of observation, only one female individual is found in the South Rottacapozza Basin, which after showing itself for a few seconds disappears in the reeds. There is also a significant anthropic impact due to the presence of bathers and the resumption of receptive and bathing activities.

In the last regular session held in July, no individuals were contacted.

7 CRITICALITIES, THREATS AND OTHER ANTHROPIC FACTORS

It should be emphasized that the project has made it possible to collect data during the spread of the SARS-CoV-2 pandemic. During this period the measures to combat the spread of the virus have almost totally reduced the anthropic pressure and besides the precious qualitative and quantitative data, it was also possible to witness how the species reacted to the decrease in disturbances, noting an immediate increase in the areas of frequentation. and the use of new perches such as the pine forest of a well-known resort in the park area (Figure 57, Figure 58). The beach was then perfectly leveled by the action of the wind and it was possible to distinguish the different footprints of the birds, especially waders, which created suggestive drawings, giving the image of what the coast would be like without the presence of man (Figure 59, Figure 60).

Figure 57: Grey herons on an unusual place

Figure 58: Piro piro piccolo crossing the street

Figure 59: Footprints of waders on the sand

Figure 60: Absence of men

For the Ferruginous duck this has had a positive impact which has given good hope for nesting. With the end of the restrictions, which led people to frequent this area and the accommodation facilities in the Park again, it seemed that the animals were much less accustomed to the presence of humans and proved more elusive than in the pre " Lockdown ". Another critical factor that was found was the succession of fires within the small and medium-sized protected area, likely consequences of the "maintenance" of the greenery carried out by the residents and beyond their control (Figure 61).

Along all the paths of the Park there are small walls (Figure 62) which, during the increasingly consistent atmospheric events, do not allow the regular flow of rainwater. In fact, after these there is an increasingly frequent flooding of the paths because the water remains trapped instead of flowing into the surrounding flooded meadows.

Figure 61: Footprints of waders on the sand

Figure 62: Absence of men

Another impact, although certainly very small compared to the previous year, is due to the free bathing activity near the Rottacapozza Sud basin. number of cars arriving on the shore but the beach was very busy and bathers often went to browse the reeds causing disturbance to the species present. Lastly, we note the removal of marsh reeds and the practice of abusive abandonment of waste (Figure 63, Figure 64).

Figure 63: Illegal removal of marsh reeds

Figure 64: One of the illegal landfills found

8 CONCLUSION

The monitoring activity further highlighted the importance of the habitats that the Litorale d'Ugento PNR protects, underlined by the constant presence of the Ferruginous duck throughout the year.

The data collection, albeit lasting only one year, made it possible to acquire information on the Ferruginous duck and other taxa of aquatic birds also in relation to the habitats present and related health conditions. The surveys made it possible to create an exhaustive database on the Park's avifaunal presences accompanied by the relative specific absolute abundances. The study led to the creation of the "focal" checklist which counts 102 species contacted in the twelve months of monitoring, a useful tool for the managing body to intercept lines of financing and projects related to species of conservation interest. The photoChart archive, in addition to documenting the research promptly, has enabled adequate communication for the design and promotion of the Park itself.

The Anatidae and the Ardeidae were the most represented aquatic families in the wetlands surveyed; the data collected in spring and autumn underlined the importance of the areas protected by the Park during migration periods where there was an increase in the number of species. Among the birds of prey, the wintering of the Lesser Eagle and the Marsh Harrier should be noted.

The target species turned out to be potentially breeding but strongly subject to direct anthropic disturbance and with little area of reeds available, especially in basins with greater trophic availability and for this reason it is assumed that the nesting has not occurred or has been interrupted. Another critical issue that emerged is linked to the limicola avifauna which was not very present due to the absence of natural banks along the basins, a factor that also influences the nesting attempts of the little tern.

The problems that emerged provided information on the areas of potential interventions, especially related to the recovery and expansion of habitats and the mitigation of anthropic impact. Another evidence is the importance of giving continuity to the monitoring action to evaluate the interventions planned by the Management Body, allowing to evaluate their effectiveness on the bird community and its evolution also in relation to changes in environmental and disturbance factors. Continuing the data collection with this methodology will also make it possible to create the historical series of the Park from which the indices of Diversity, Specific Wealth, Equipment and

Specific Dominance can be extracted through mathematical models. These indices will make it possible to constantly assess the integrity of the wetlands protected by the PNR and support the managing body in planning and decision-making processes with a view to continuous improvement in order to protect the precious biodiversity of this stretch of Salento. Lastly, it should be borne in mind that, being conformed to national and international standards, this action is highly replicable for other protected areas with similar characteristics, thus strengthening the Regional Ecological Network by improving its management methods.

9 PHOTOGRAPHIC APPENDIX

As already mentioned, photographic evidence was acquired during the monitoring activity in order to create an archive to support the scientific data collected. The shots taken, albeit of a documentary nature, evoke the sensations experienced during the field trips showing the beauty of this stretch of Puglia and the importance of biodiversity that characterizes it. Below is a selection of the most evocative shots taken in the Litorale d'Ugento PNR.

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